

Letter Health Consultation

IN-HOME POST-FIRE REMEDIATION AIR SAMPLING

Post Falls, Kootenai County, Idaho

June 1, 2016

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members.

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You may contact the Environmental Health Education and Assessment Program, Idaho
Department of Health and Welfare
208-334-5682

LETTER HEALTH CONSULTATION

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POST FALLS, KOOTENAI COUNTY, IDAHO

Prepared By:

Environmental Health Education and Assessment Program
Bureau of Community and Environmental Health
Idaho Department of Health and Welfare
Under a Cooperative Agreement with the
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June 1, 2016

Gina Prindle Ph.D., FNP
Director, School Based Health Center
Heritage Health
1090 W. Park Place
Coeur d'Alene, ID 83814

Dear Dr. Prindle,

The Environmental Health Education and Assessment Program (EHEAP) of the Idaho Department of Health and Welfare (IDHW) developed this letter of health consultation to address health questions regarding in-home post-fire remediation air sampling at a residential site in Post Falls, Kootenai County, ID. The EHEAP has assessed air sampling data gathered from the site on May 3, 2016. The assessment includes volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). This assessment focuses on the residential inhalation exposure to the chemical compounds assayed for during the May 2016 sampling. The objective of this assessment is to identify any human health risks associated with residential exposures to the chemicals tested for, and detail actions (if any) that residents should take to ensure the protection of health from potential exposures to chemicals in the air at the site.

The EHEAP concludes that based upon the available sampling data, the chemicals tested for in the residential indoor air is not expected to result in adverse human health effects. The EHEAP recommends that residents experiencing nuisance odors at the site take steps to ventilate the site as adequately as possible. As the conclusions of this report are based upon a single sampling event, persistent adverse health effects or symptoms may warrant subsequent sampling of the site's indoor air to ensure that this sampling data accurately reflects site conditions. The EHEAP further recommends that residents experiencing persistent adverse health effects or symptoms contact their personal physician for medical consultation.

A Note on Analytical Test Results: Detection Limits and Reporting Limits.

When evaluating analytical testing results, a Method Detection Limit (MDL) is the lowest concentration at which a compound can be detected in a sample with the particular methodology/instrumentation being employed. On the other hand, a Reporting Limit (RL) is the lowest concentration at which a particular test method/instrumentation can detect a compound and report that compound's concentration with a sufficient degree of accuracy and precision. In

essence, a MDL indicates the presence of a compound, though it is not at sufficient concentration to assign it a concentration value with any degree of confidence. A RL is the level that, above which, the test method can be presumed to accurately measure a compound's concentration in the sample being tested. A more involved explanation has been documented by the California Department of Public Health's Sanitation and Radiation Laboratories Branch (CDPH, 2005).

TOXICOLOGICAL EVALUATION

The EHEAP assessed potential risks to human health by comparing data from the sampling date (5/03/2016) against health-based comparison values (CVs) generated by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) (ATSDR, 2016), as well as risk-based regional screening levels (RSLs) developed by the U.S. Environmental Protection Agency (EPA) (EPA, 2015b). A CV is a concentration of a substance in air, water, food, or soil that is unlikely to cause harmful health effects in exposed people. It should be stressed, however, that CVs are screening tools, not thresholds of toxicity. While levels at or below a CV may reasonably be considered safe, it does not necessarily follow that concentrations above a CV would be expected to cause harmful health effects. Rather, levels above a CV indicate the need for further investigation and assessment.

For potential cancer health effects, the EHEAP compared reported chemical concentrations to ATSDR Cancer Risk Exposure Guidelines (CREGs) where available (ATSDR, 2016), and EPA regional carcinogen screening levels (EPA, 2015b) in the absence of a CREG. Chemical concentrations that exceeded these screening values were then evaluated using the Excess Cancer Risk Equation (ATSDR, 2005a) found in appendix B.

Non-cancer Health Effects:

None of the chemicals detected above RLs exceeded existing non-cancer health guidelines or remediation standards (**Table A1**). Therefore, the EHEAP finds that non-cancer adverse health effects are not likely to occur at this site due to exposures to the chemicals that were analyzed in the air sampling performed on May 3, 2016.

P-isopropyltoluene (p-cymene):

The chemical p-isopropyltoluene was detected above the RLs for the analytical test used for this sample. P-isopropyltoluene, commonly referred to as p-cymene, is a mild irritant to eyes and skin. It is the aromatic component of thyme and cumin oils. It is used in the manufacture of some paints. Inhaling vapors of this substance is considered to be of low human health hazard (LCSS, 2016). Due to the relatively low hazard of this substance, no regulatory or health-based guidelines for air exposures have been established. As a VOC commonly encountered in industrial settings, p-cymene is often included as part of a VOC analytical testing package.

Benzene Inhalation Cancer Risk:

Benzene is an International Agency for Research on Cancer (IARC) class 1 carcinogen (known human carcinogen) (ATSDR, 2007). The risk of excess cancer due to inhalation exposure to benzene was calculated. The calculated excess cancer risk for this benzene exposure over a lifetime (70 years) is 1.56×10^{-6} , or about two excess cancer cases (a cancer specifically attributable to benzene) in one million exposures to this concentration of benzene. The EPA has set a target cancer risk range of 1×10^{-4} to 1×10^{-6} (1 in 10,000 to 1 in 1,000,000); EPA considers

excess cancer risks that are below 1×10^{-6} to be so small as to be negligible (EPA, 1991; 2015). The excess cancer risk for benzene inhalation at this site based upon this data is within EPA's target cancer risk range (**Table 1**). Therefore, the EHEAP concludes that the cancer risk due to benzene inhalation at this site is not expected to represent a significant excess cancer risk. For general information regarding benzene and how it may affect human health, please find the enclosed ATSDR ToxFaq sheet for benzene.

Carbon Tetrachloride Inhalation Cancer Risk:

Carbon tetrachloride is an IARC class 2B carcinogen (possible human carcinogen) (ATSDR, 2005b). The risk of excess cancer due to inhalation exposure to carbon tetrachloride was calculated. The calculated excess cancer risk for this carbon tetrachloride exposure over a lifetime (70 years) is 1.02×10^{-6} , or about one excess cancer case (a cancer specifically attributable to carbon tetrachloride) in one million exposures to this concentration of carbon tetrachloride. The excess cancer risk for carbon tetrachloride inhalation at this site based upon this data is within EPA's target cancer risk range (**Table 1**). Therefore, the EHEAP concludes that the cancer risk due to carbon tetrachloride inhalation at this site is not expected to represent a significant excess cancer risk. For general information regarding carbon tetrachloride and how it may affect human health, please find the enclosed ATSDR ToxFaq sheet for carbon tetrachloride.

Chloroform Inhalation Cancer Risk:

Chloroform is an IARC class 2B carcinogen (possible human carcinogen) (ATSDR, 1997). The risk of excess cancer due to inhalation exposure to chloroform was calculated. The calculated excess cancer risk for this chloroform exposure over a lifetime (70 years) is 2.3×10^{-6} , or about two excess cancer cases (a cancer specifically attributable to chloroform) in one million exposures to this concentration of chloroform. The excess cancer risk for chloroform inhalation at this site based upon this data is within EPA's target cancer risk range (**Table 1**). Therefore, the EHEAP concludes that the cancer risk due to chloroform inhalation at this site is not expected to represent a significant excess cancer risk. For general information regarding chloroform and how it may affect human health, please find the enclosed ATSDR ToxFaq sheet for chloroform.

Cumulative Cancer Risk from Chemicals above RLs:

The cumulative excess cancer risk was calculated by summing the cancer risks from each chemical detected above RLs for the test assay. Combining the three, the cumulative lifetime excess cancer risk (70 years) is 4.88×10^{-6} , or fewer than five excess cancer cases in one million exposed people (**Table 1**). As this is within EPA's target cancer risk range, the EHEAP concludes that the cancer risk due to inhalation exposure to chemicals tested for at this site are not expected to represent a significant excess cancer risk.

Table 1: Cumulative cancer risk from all carcinogens above test RLs and exceeding CVs.

Chemical	Concentration Reported ($\mu\text{g}/\text{m}^3$)	CREG ($\mu\text{g}/\text{m}^3$)	Excess Cancer Risk	EPA Target Cancer Risk Range
Benzene	0.2	0.13	1.56×10^{-6}	1×10^{-4} to 1×10^{-6}
Carbon Tetrachloride	0.4	0.17	1.02×10^{-6}	
Chloroform	0.1	0.043	2.30×10^{-6}	
Total			4.88×10^{-6}	

LIMITATIONS

It is essential to note that this consultation relies on the one existing air sample data which does not encompass all possible air contaminants that can be found in a home. It remains possible that other, untested contaminants are present in concentrations high enough to present a risk to the health of humans.

CONCLUSIONS AND RECOMMENDATIONS

Based on an evaluation of the available air sampling data from May 2016, the EHEAP concludes that exposure to home indoor air for the chemicals tested at this site is not expected to harm human health. Benzene, carbon tetrachloride, and chloroform exceeded their respective ATSDR CREG values. However, individual chemical and cumulative chemical cancer risk from these exposures is within EPA's target risk range. No chemical tested in this assay exceeded non-cancer health-based guidelines or standards.

Based on the above conclusions, the EHEAP recommends the following actions at this site:

- Persistent nuisance odors should be addressed through adequate ventilation of the home. Though not a health hazard per se, nuisance odors can erode enjoyment of domicile and quality of life.
- Occupants of the site should seek medical attention from their personal physician should they experience ongoing adverse health effects (headaches, nausea, vertigo, etc.).
- Though follow-up air sampling is not warranted by the results evaluated here; persistent or intractable adverse health effects may warrant further sampling to increase confidence in the validity of the results evaluated herein.

If you have any questions regarding this report, please contact Dr. Craig J. Dietrich at (208) 334-5682 or by email at dietrich@dhw.idaho.gov.

Sincerely,
 Craig J. Dietrich, Ph.D., DABT
 State Health Toxicologist
 Environmental Health Education and Assessment Program
 Idaho Dept. of Health and Welfare

Enclosed:

ATSDR ToxFaq: Benzene

ATSDR ToxFaq: Carbon Tetrachloride

ATSDR ToxFaq: Chloroform

REFERENCES:


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APPENDIX A: DATA TABLES

Table A1: Site sample results of Modified EPA TO-17 and “Fire Scan” chemical compounds found above test method RLs.

Chemicals above RL	Test Results (µg/m ³) ^a	Residential Exposure Guidelines, Standards & Classifications				IARC Cancer Classification ^b
		ATSDR Chronic EMEG/ MRL ^b (µg/m ³)	ATSDR CREG ^b (µg/m ³)	EPA RfC ^c (µg/m ³)	EPA Carcinogen Screening Level ^c (µg/m ³)	
TO-17						
Benzene	0.2	9.6	0.13	30	0.36	1
Carbon Tetrachloride	0.4	190	0.17	100	0.47	2B
Chloroform	0.1	98	0.043	98	0.12	2B
Ethylbenzene	0.2	260	-	1000	1.1	2B
p-Isopropyltoluene (p-Cymene)	0.6	-	-	-	-	NC
Styrene	0.1	850	NA	1,000	NA	2B
Toluene	0.6	300	NA	5000	NA	3
1,2,4- Trimethylbenzene	0.2	-	NA	7.0	NA	NC
m,p-Xylene	0.5	220	NA	100	NA	3
o-Xylene	0.2	220	NA	100	NA	3
Fire Screen						
m,p-Cresol	0.3	-	NA	600	NA	NC
o-Cresol	0.7	-	NA	600	NA	NC
2-Furaldehyde (Furfural)	1.0	-	NA	50	NA	NC

^a note that nanograms/liter (ng/L) is equivalent to $\mu\text{g}/\text{m}^3$ ^b(ATSDR, 2016)^c(EPA, 2015b)**Key**

	Value exceeds guideline or standard
$\mu\text{g}/\text{m}^3$:	micrograms/cubic meter-note that ng/L (nanograms/liter) is equivalent to $\mu\text{g}/\text{m}^3$
EMEG:	ATSDR Environmental Media Evaluation Guideline
MRL:	ATSDR Minimal Risk Level
CREG:	ATSDR Cancer Risk Evaluation Guideline
RfC:	EPA Reference Concentration
NA:	A value is Not Applicable for this compound because it is not a known or suspected carcinogen
NC:	The substance has not yet been classified by the IARC
IARC 1:	Known human carcinogen
IARC 2B:	Possible human carcinogen
IARC 3:	Not classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity is inadequate in humans and inadequate in animals to warrant the classification as a carcinogen.

APPENDIX B: EXPOSURE DOSE CALCULATIONS

Exposure Dose Concentration (ED) calculation for inhalation (ATSDR, 2005a):

$$ED = C$$

Where:

ED = Exposure dose concentration (microgram per cubic meter [$\mu\text{g}/\text{m}^3$])

C = Contaminant concentration in air ($\mu\text{g}/\text{m}^3$)

Excess cancer risk calculation for inhalation of benzene (Table 1) (ATSDR, 2005a)

$$\text{Cancer Risk (CR)} = \text{Exposure Dose (ED)} \times \text{Unit Risk Factor} \times (\text{Exposure Years} / 70)$$

Example for Benzene:

Exposure Dose = $0.2 \mu\text{g}/\text{m}^3$ (see page 4)

Unit Risk Factor = 7.8×10^{-6} per $\mu\text{g}/\text{m}^3$ for benzene (EPA, 2015b)

Exposure Years = 70

$$\begin{aligned} \text{Cancer Risk} &= 0.2 \mu\text{g}/\text{m}^3 \times 7.8 \times 10^{-6} \times (70 / 70) \\ &= \mathbf{1.56 \times 10^{-6}} \end{aligned}$$